



Episode 3 | It began with recognizing that the world was changing – a walk in the woods with Geert...

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Let's start with the most important question: What are you doing today - on the 21st day of August 2024 - to make your vision for the future a reality?

OK. Well, spoiler alert – I'm not sure where I am today! In this transition year, uncertainty is the normal. Change is the only certainty – in the past, the present, and the future.

OK, let's start with the past. Everything passes except the past. How did it all begin?

I did my PhD in electrical engineering at the University of Twente, focusing on medical technology and ergonomics – how people interact with technology. After finishing my PhD,

I worked for Philips Research and NXP for almost a decade. In 2009, my career evolved. I became a professor, doing both teaching and research for another 10 years. But after those 10 years, I realized I wanted to get back to doing research closer to industry. That's when I decided to come to imec. My work has always been at the edge of research and industry. I take the industrial approach in the university; in the industry, I take the research approach. I've always crossed the boundaries between these two worlds.

What did you work on when you joined imec?

There was a group working on wearables. We were strong in low-power systems and physiological measurements. When I came in four years ago as a program manager, we saw that the wearables market was stagnating. People were asking for more of the same – another heart rate sensor, another fitness tracker. It was mostly customization.

When I started, I said, "Let's move away from just measurements." You want to interfere with human physiology. You might want to stimulate nerves or filter like a kidney—to actually *do* something. Because if you can sense and stimulate/actuate, you can create a closed loop. That loop, by definition, becomes adaptive, more stable, more dynamic. Our whole body is full of closed loops and equilibria, so combining sensing and stimulation was the future direction. And if you really want to have an impact on the human body, sometimes you need to go inside.

Essentially, we shifted from focusing only on wearables for measurement to working on implantable solutions. These are more like artificial organs or bioelectronic medicine, which essentially act as adaptive systems. That's been my focus as a program manager.

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What are the impacts of such technologies? Have they ever been deployed?

Strictly speaking, a pacemaker is a very primitive form of bioelectronic medicine. You replace the sinus node in the heart by adding electronics. It's a form of medicine. That was the first. Today, we have several other well-established bioelectronic devices, like deep brain stimulation for Parkinson's, vagus nerve stimulation for epilepsy, and spinal cord stimulation for lower back pain. These are all for severe conditions - diseases where people may suffer terribly, even to the point of preferring death without treatment.

We aim to expand these systems, making them more adaptive and precise for less severe conditions, like arthritis, blood pressure irregularities, or even depression. I believe electronic systems have the potential to help restore balance in the body, allowing people to live their normal lives while managing chronic conditions. With these technologies, you can still live a full life—you can play with your children or grandchildren and rely on IMEC's nanotechnology without constantly worrying about your condition.

What motivated you to pursue this line of research? Was there a specific moment that convinced you this was the path?

Oh, now we're going back in time! Even before I started my studies, I remember a pivotal moment in my childhood. There was a book that explained how you could control things with your computer. It showed how to modify the printer port to turn on an LED or use the serial port to make a motor run. I think I was still a teenager when I realized I could make things *move*—combining software with hardware to interact with the physical world. That fascinated me.

During my studies. I realized I could use electrical engineering in a way that wasn't just routine. Many topics in the field are well-established—you know, like chip design. There's a clear process, and it can be planned step by step. However, interacting with the human body is still largely unexplored. It's like Columbus discovering America—it's new, full of unknowns.

Transitioning from wearables to implantable solutions seemed to have opened a whole new world of possibilities. Was there a moment that convinced you that this was the direction you had to take?

That transition was already happening within the team when I joined imec. I'd love to take credit for it, but it was a shift that the team was already working on. That's how we operate at imec - it's never just one person. Of course, you can be proud of your individual work, but it's always a team effort.

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Do you remember how the team arrived at that decision? What prompted the shift?

It began with recognizing that the world was changing. We realized we were repeating ourselves with wearables, so we needed to shift focus. It's always a difficult decision because for a year or two, you might not see much revenue from your older products, but you have to dive into new territory - develop new solutions and build new relationships with customers and hospitals.

Was there resistance to that transition?

Yes, definitely. Some people felt like the ground was shifting under their feet. Transitions are never easy. But in the end, you assess the team's competencies, the strengths of the individuals, and the market's needs. You try to tailor your strategy to

both the market demands and the talents within imec. Ultimately, I think most people came to see it as a better direction, but not everyone. Transitions are always tough.

It seems like change is really part of the DNA here, especially in imec-nl, given its history and the constant need for adaptation.

Absolutely. Change is necessary, especially for a company like imec, where innovation is at the heart of everything we do. By definition, innovation means embracing change, and that may involve changing how the organization operates. Even for our relatively small imec satellite department in Eindhoven, we had to shift from serving one local company, like Philips, to catering to a global market. Now, our focus extends to serving the Netherlands and the entire world.



Given the reorganisation, what is your scientific vision in the coming years?

Yeah, that's part of the transition, and I need to consolidate that. I'll work on building a stronger connection with the nervous system, especially as I align my university position with my role here. The goal is to target diseases that have a significant impact.

For instance, addressing depression or pain would be incredible. I want to focus more on mental health conditions. At the end of the day, the nanotechnology that we sell should have a purpose.

It's a fascinating, underestimated part of the body. We always thought of the brain as a standalone computer, but the peripheral nervous system is part of that system, constantly interacting with the brain and other organs. For instance, the heart isn't just a pump; it's part of a controlled system, linked to the nervous system in a way we've only recently started to understand. As an electrical engineer, addressing the nervous system is actually something I can work with—it's relatively approachable from a technical perspective.

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What is your approach to navigating this new transition?

I recognize that this transitional period involves finding a balance between letting go of outdated practices and embracing new roles or directions within the company. It's crucial for middle management, including myself, to figure out how we can serve as the glue that holds everything together and drives the company forward. This requires introspection about what kind of impact I want to make and how I can align my personal aspirations with the evolving structure of the organization. Finding a new identity is not only important for me personally, but also for the groups, teams, and programs we work with. We need to redefine ourselves both individually and collectively.

That sounds like it requires a lot of communication and mutual understanding.

Exactly. You can't force that kind of change to happen quickly. It takes time, successes, and improvements, maybe even new partnerships. It's a process. This transition won't be complete by 2024, but that's when the real impact will start to show.

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You've been through many transitions before.

Yes, but this is a bigger transition for both the company and me. It's not the first time, but it's more impactful because it affects who I am and what I do.

I can see that. Maybe we can go back to my first question - what are you specifically working on today, the 21st day of August 2024?

Oh, I'm just a few days away from my holiday! I'm wrapping things up.

What's the number one thing on your to-do list before your holiday?

I'm working on a European project proposal. I've told myself this is the last thing I'll do for our photonics portfolio before my holiday. After that, I'll shift my focus to neurology. Photonics may still be a part of my work, but the broader research line will be passed on to my colleague, Evelien. She's handling spectral-based sensing, while I'll be focusing on neurology and activation. We're dividing up the tasks, and I'm finishing the proposal for Evelien before I leave.

That's a nice transition. To move toward the future, you have to let go of some things from the past.

And you're not just passing the problem on—you're actually re-distributing the portfolio. Creating a new research portfolio together feels better than handing over old projects!

I can't wait to see what the future holds for us.

Same here. Let's head back and get started.

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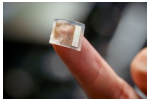
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